



Test and Diagnostics For IP & Carrier Ethernet

Product Catalog

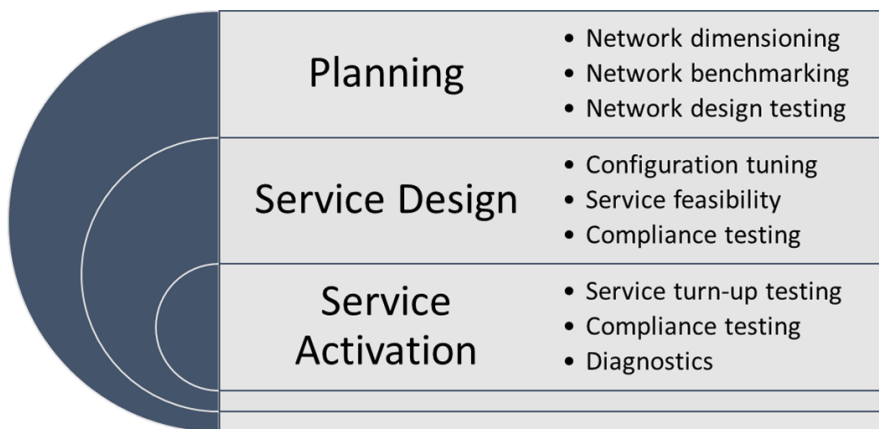




Introduction

With widespread adoption of IP and Ethernet based networking technologies, telecom service providers need to differentiate themselves from the competition by rapidly deploying services, minimizing network downtime, and providing excellent customer care. Reliability, efficiency, and cost-effectiveness are crucial. Further as next-generation services are delivered using NFV, Cloud and SDN capabilities, they need to ensure and prove to their customers that the performance of these services meet promised SLAs.

SAMTEST provides the efficiency and capabilities required by service providers to effectively plan, design, roll-out and manage their IP, MPLS and Ethernet services for Cloud and Data Center Interconnect, Business Services, Mobile Backhaul and Wholesale. SAMTEST enables service providers to benchmark specific sections of Access, Metro and Core networks and expedite end-to-end troubleshooting. SAMTEST may also be used by equipment vendors who want to perform testing before deployment in production networks.



SAMTEST is an award winning solution that delivers very compelling benefits, including:

- Reduces testing time and effort by automated testing by up to 80%
- Provides device independent and in-depth validation compared to NIDs
- Enable exhaustive testing with detailed auto-diagnostics
- ROI of under 4 months



SAMTEST for testing and diagnostics

SAMTEST consists of a centralized controller utilizing physical and virtual probes distributed in the network. SAMTEST controller runs on COTS hardware or as a VM. Veryx physical and software probes are available in various configurations supporting test interfaces from 100M to 10G for testing IP, MPLS and Carrier Ethernet services.

SAMTEST supports all the industry and benchmarking standards so that telecom service providers and operators have the flexibility to choose the right options based on their design and fulfillment processes.

SAMTEST provides automated test libraries that not only enables drastic reduction in testing effort, but also ensure repeatability and consistency of test results and analysis.

TEST FEATURES	
> L2/L3 Testing :	MEF 3.0, MEF CE 2.0, ITU-T Y.1564, RFC 2544
> Diagnostics:	Y.1731, 802.1ag, TWAMP
> L4 Benchmarking:	TCP (RFC 6349), UDP Echo
> L7 Benchmarking:	VoIP, HTTPS, DNS*, VoD *
* In roadmap	

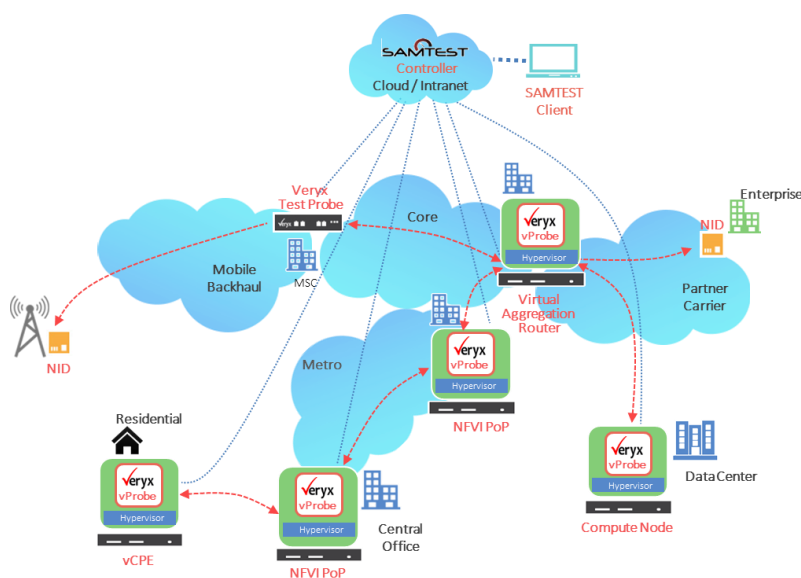


Figure 1 : Veryx SAMTEST - Field Deployment

*“After evaluating various Carrier Ethernet capable testing tools, Veryx SAMTEST came out on top as the solution to address Integra's Carrier Ethernet testing needs. The ability to uncover and resolve issues that would otherwise be raised by customers after activation, as well as **SAMTEST's built-in automation that reduces the time it takes to provision and turn-up our services, greatly improve Integra's customers' experience.** The inclusion of this application in our process further advances our leading position in Carrier Ethernet Services.”*

- Michael Sharpe, COO, Integra Telecom



One solution for multiple customer challenges

Service Design testing – in the lab

Network design engineers and architects need to take into account a number of factors when defining service SLAs. As they perform the task of defining service offerings and accordingly optimize equipment configurations, they need to better understand service behavior by determining aspects such as below:

- How well does the circuit perform shaping or policing of traffic at ingress
- How does the circuit handle burst capabilities
- How does the circuit handle Layer 2 control protocols and SOAM frames
- How does the circuit provide support for capabilities such as multi-CoS, multiple bandwidth profiles, multiple EVCs per UNI etc.

Often the above verification process needs to be repeated after network and software upgrades, and can become a cumbersome process.

Veryx SAMTEST is one tool that can perform all these tasks with ease, in an automated manner, that network design engineers and architects can be fully confident about committed SLAs in the product offerings. In addition, SAMTEST is a solution that provides compliance verification in accordance with industry standards – MEF 3.0, MEF CE 2.0, ITU-T Y.1564, IETF RFC 2544 and IETF RFC 6349.

SAMTEST is being used in the lab by network architecture teams during the design of services to verify that the expected performance levels are met. SAMTEST's pre-built automated test suites enable service providers to efficiently design and roll-out IP, MPLS and Carrier Ethernet services.

**.. With SAMTEST,
network design
engineers and
architects can be
fully confident
about committed
SLAs ...**

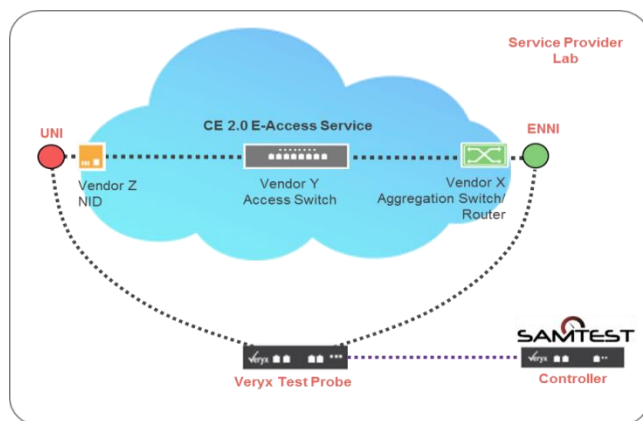


Figure 2 : E-Access Test Topology in Lab

SAMTEST is also being used by network design teams to verify conformance, benchmark SLA compliance, benchmark network scalability, optimize equipment utilization, benchmark network equipment and verify interoperability.

Service fulfillment - in the field

The current generation of test tools are typically hand-held and testing is performed manually after having deputized the engineers onsite. This severely limits the capability to do on-demand performance measurements and monitoring – and being a manual process could be time-consuming, expensive and inefficient.

As more and more Veryx customers are realizing, SAMTEST is the superior centralized solution that enables quick service activation testing, before handover of circuits to customers, by completely automating the testing involved. Utilizing SAMTEST automated test libraries that not only results in drastic reduction of testing effort, but also ensure repeatability and consistency of test results and analysis. In addition, vProbes is an attractive option, since they can be dynamically moved to any of the POPs easily as need – resulting in optimal resource utilization.

Veryx test libraries perform comprehensive testing for performance as well as service attributes. This results in circuits that are well tested before handing over to customers and ensure that any potential faults in the network are uncovered quickly.

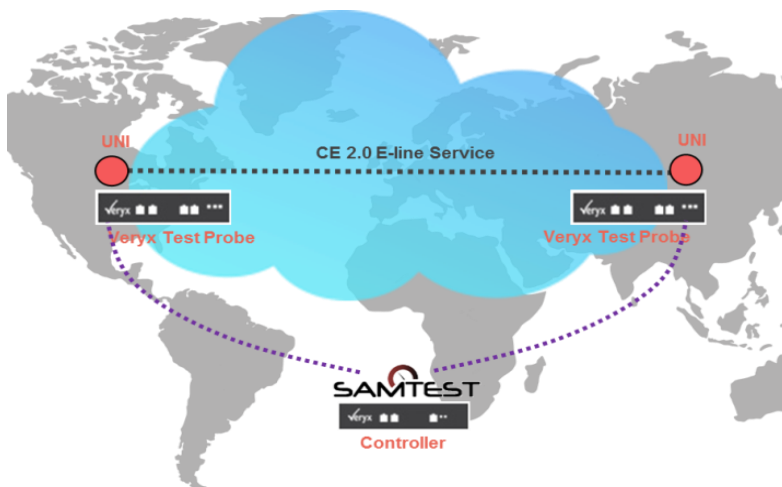


Figure 3 : E-line Test Topology in Field

SAMTEST enables quick service activation testing before handover of circuits to customers

Testing and Diagnostics Features

Test Methodologies : RFC 2544, Y.1564, MEF CE 2.0, MEF 3.0

- MEF CE 2.0 service verification for ELINE, ELAN and ETREE (Ethernet Subscriber Services - MEF 6.1) and Access ELINE services (MEF 33)
- MEF 3.0 service verification for ELINE (Ethernet Subscriber Services - MEF 6.2) and E-Transit services (MEF 51.1 and MEF26.2).
- IP / MPLS service verification using ITU-T Y.1564

CE 2.0 service attribute verifications

- VLLAN/CoS Transparency, Bundling, MTU, Service Leakage, L2CP (Tagged & Untagged)/SOAM, Source MAC Address Limit, Test MEG, Subscriber MEG MIP

Bandwidth Profile(Token Share & Envelopes) and Performance Parameter Verification

Burst Testing as per MEF 10.3

Tagging Support: 802.1q, Q-in-Q

Multi-Cos Testing

Auto diagnostics

802.1ag/Y.1731 and Smart Loopback

Birth Certificates and Customer Portal

Graphical performance charts, PDF reports and test logs



Diagnostics

Veryx SAMTEST quickly isolates issues related to connectivity, SLA and MEF attributes related issues. SAMTEST comes with pre-built test scenarios specifically to facilitate diagnostics. Veryx vProbes can be strategically deployed on-demand at NFVI POPs to determine bottlenecks introduced by Virtual Network Functions in the service chain.

SAMTEST Field Deployment Models

Peer Probe Testing: In this deployment model, SAMTEST performs testing using test probes at both the ends. It can be between UNI and UNI or UNI and ENNI. It can be performed using physical probes or a combination of both.

This model is ideal for (i) wholesale service scenario, where service providers do not have control over the access provider network devices to perform the required testing as part of benchmarking the partner network circuit, and (ii) premium services offered to key customers to ensure maximum service integrity.

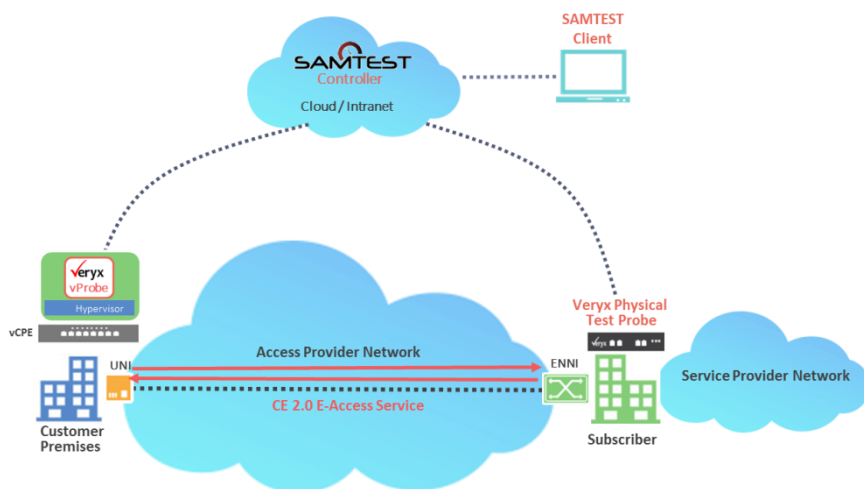


Figure 4: SAMTEST for Wholesale Service Testing

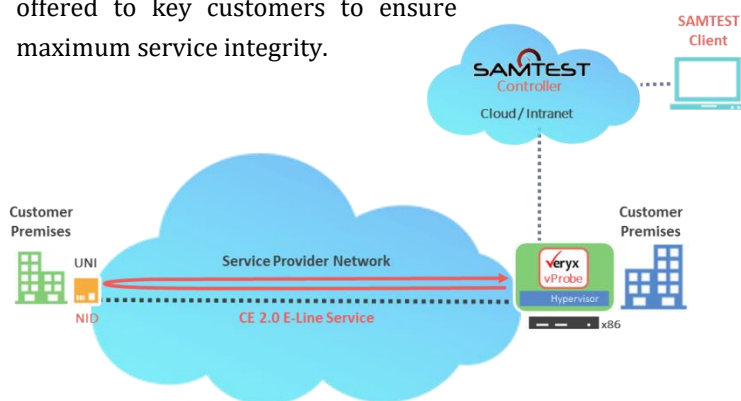


Figure 5: SAMTEST Loopback Testing

Loopback Testing: In this deployment model, SAMTEST performs testing using test probes at a suitable aggregation point and looping back the traffic from third party Ethernet Access devices. Testing using this variant would require the Ethernet Access device to support either smart loopback (MAC swap) or Y.1731.

L4 – L7 Performance Benchmarking

SAMTEST L4 – L7 Performance Benchmarking helps enterprises and service providers to quickly measure the quality of experience for end users for TCP, HTTP and VoIP services. These tests can be done using SAMTEST vProbes, which can be deployed in any commercial off the shelf x86-based servers. SAMTEST vProbes can also be spun-up on demand on NFV Infrastructure for benchmarking. This tool emulates hundreds of simultaneous sessions / calls to simulate the real time test scenario.

SAMTEST TCP Benchmarking uses the testing methodology defined in IETF RFC 6349, provides accurate measurements of TCP metrics. One example deployment here shows how the SAMTEST vProbes can be deployed on the distributed NFVI or any x86 servers at the customer edge to benchmark TCP performance metrics.

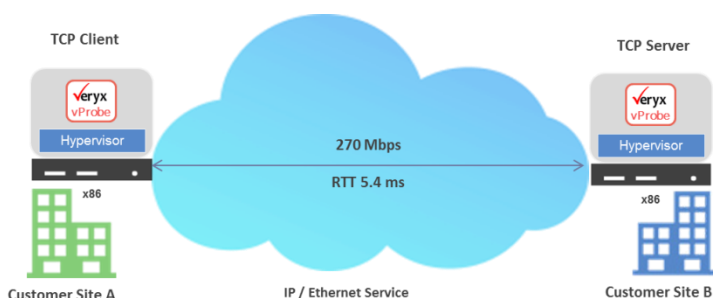


Figure 6: SAMTEST TCP Benchmarking

SAMTEST HTTP Benchmarking measures the key parameters of HTTP application like download time and download rate which helps in tuning the performance of the network and the server applications to give better service to end customers.

SAMTEST VoIP Benchmarking provides important statistics of SIP signaling and RTP media and also provides quality of user experience using R-factor and MOS values defined in ITU-T G.107.

NAME	DESCRIPTION	SPECIFICATION	METRICS
TCP Benchmarking	TCP performance tests through emulation of stateful TCP sessions	IETF RFC 6349	Path MTU, Baselined RTT, Throughput with different window sizes or different no. of sessions, Re-transmission count, Transfer time Ratio, Efficiency, Buffer Delay Percentage, Optimal window size and session
HTTP Benchmarking	HTTP performance test through full emulation of client and server	HTTP 1.1	Response time, Download time Download rate, Web Page rendering time
VoIP Benchmarking	VoIP performance tests through emulation of VoIP calls in real-time	SIP, SDP, RTP, ITU-T G.107	Call Connect Time, Hang-up Time Packet Loss, Jitter, R-factor, MOS



Veryx SAMTEST Framework

Veryx SAMTEST Framework is a comprehensive tool that enables centralized Service testing, Diagnostics and monitoring. SAMTEST framework supports Veryx pre-built automated tests, with flexibility for customization and new test additions, to suit today's dynamic test requirements. SAMTEST enables easy configuration, CLI/ GUI-based access, easy debugging and detailed reporting.

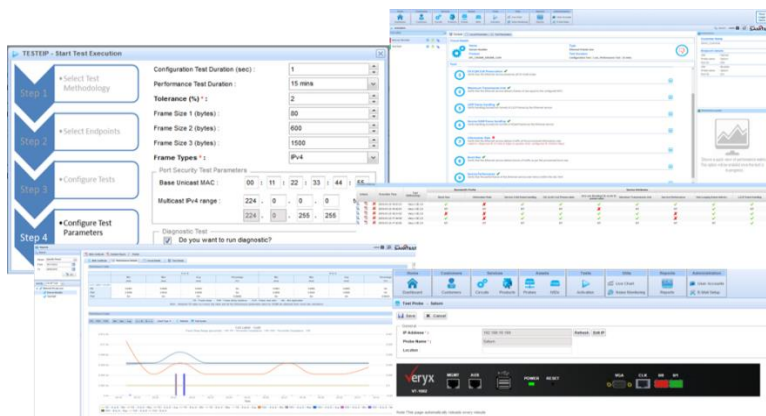


Figure 7: SAMTEST test and diagnostics screens

Veryx SAMTEST's user friendly GUI allows easy configuration of Service definitions and Veryx test probes to enable testing and monitoring. Its unique design results in minimal time for set-up and enables efficient use of time and resources. SAMTEST reports address the needs of a broad audience from technical to executive levels and customers to provide comprehensive insights into SLA performance at various levels.

SAMTEST provides excellent graphical reports to enable Network engineers and Network Managers track the overall status of Service Activation, continuous SLA measurements, alarms and trouble resolution.

The customer portal enables per customer based reporting which can directly be shared with the customer.






- **Multi-user**
- **Web-based Access**
- **Centralized Control**
- **Flexible Reporting**
- **Flexible test profile selection**
- **Test Customization**
- **Pre-built tests**
- **Inbuilt Verification**
- **Auto Diagnostics**
- **Alarm Dashboards**
- **Automated Testing**
- **Birth Certificate**
- **One Touch Execution**
- **Test Queuing**
- **Customer Portal**

Hardware Probes

Veryx SAMTEST supports a range of probe hardware and software providing flexibility and necessary support for diverse testing requirements.

All Veryx hardware probes include Veryx PktBlaster, a versatile software-based test automation and traffic generation toolkit designed for testing Ethernet-based devices. It supports APIs for easy integration with home-grown test automation scripts, which currently utilize popular traffic generators.

Veryx probes are capable of generating stream-based traffic and analysis of received packets based on streams as typically needed in functional and conformance testing scenarios. This helps the tester to release expensive traffic generation ports and optimize test resource utilization.

VT-201 	1GE Test Probe 1 port 1GbE (electrical)
uCPE 	X86 Whitebox 1G/10G (electrical/optical)
Xena 	Xena Valkyrie 1G / 10G / 100G TG (partner platform)
Software based probes  	vProbe - 1 / 10G KVM / EXSi / AWS cProbe - 1 / 10G Docker

PktBlaster - Traffic Generation and Capture

Transmission

Transmission streams per port – 16
Field modifiers per stream – 8 (32-bit)
Burst Size – 5 MB total size

Reception:

Reception streams per port – 128
Wire-speed capture up to 128k packets
Port Statistics

Histogram Statistics

Packet editor with support for both protocol and byte-level packet definitions

Automatic protocol decoding of incoming packets

TCL libraries for custom automation

Error injections on the fly

With this traffic generation toolkit, it is possible to define multiple transmit- and receive-streams with their own exclusive traffic profile. Each stream can generate many unique traffic flows by using programmable packet field modifiers. Generated Ethernet and IP traffic can be used to perform verification of equipment under real-world conditions.

Physical Probes

VT-201:

1.61"H x 7.7"W x 5.78"D (41mm x 196mm x 147mm), 2.2Lbs
Test port: 1x1 GbE RJ45

Whitebox / UCPE: Lanner NCA-4210B or equivalent:

1.73"H x 17.24"W x 12.64"D (44 mm x 438 mm x 321 mm), 9.68Lbs
Test ports: 4x1 GbE RJ45, 4x10 GbE SFP+

Xena Valkyrie Compact:

1U chassis, 1.7"H x 17.2"W x 9.8"D (43mm x 437mm x 249 mm), 10Lbs
Test ports: 6x1 GbE SFP / 6x10 GbE SFP+ / 2 x 100GbE QSFP+

Xena Valkyrie Bay:

4U chassis, 7"H x 19"W x 19.7"D (177.8 mm x 482.6 mm x 500mm), 36.4 lbs
Test ports: 6x1 GbE SFP / 6x10 GbE SFP+ / 2x100GbE QSFP+

Virtual / Container System Requirements

1G - 4 vCPUs, 2 GB RAM, 5 GB HDD, DPDK enabled NICs

10G - 4 vCPUs, 4 GB RAM, 5 GB HDD, DPDK enabled NICs

Hypervisors:

KVM(Qemu 2.0.0, libvirt 1.2.2)

VMWare ESXi 6.0 / 6.7

AWS:

1G – t2.micro ;

10G – t2.medium

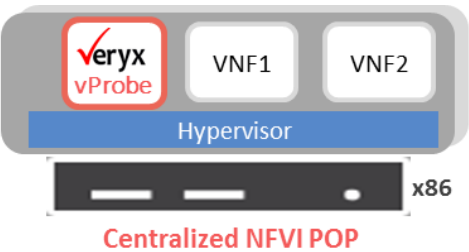


SAMTEST Virtual Probes

Veryx vProbes are available for 1GbE/10GbE port speeds, can be spun-up on x86 hardware at the centralized NFVI PoP or as VNFs on Distributed NFVI such as virtualization capable network elements including switches, routers, vCPEs, etc.

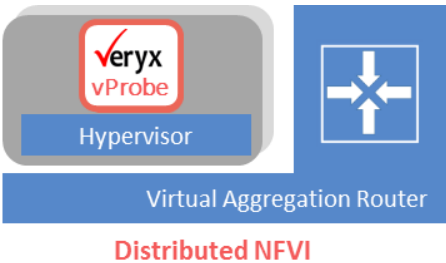
Veryx vProbe is ideal for the Life-cycle Service Orchestration (LSO) world where dynamic service configuration, turn-up testing, on-demand monitoring is required. It can be integrated with orchestration system so that the entire service assurance process is automated.

Figure 8: vProbe on COTS



Veryx vProbes are aligned with ETSI MANO architecture which is an advantage for service providers as there is no management overhead and users can readily perform service assurance testing with vProbes.

Figure 9: vProbe on Network Element



vProbe Features
Compact foot print
Orchestrated migration on-demand
Aligned with ETSI MANO Architecture
Traffic generation/analysis up to 10Gbps
Compatible with Veryx physical probes
Supports industry standard hypervisors including KVM and VMware ESXi as well as Docker.

System Requirements
4 vCPUs, 2 GB RAM, 5 GB HDD, Intel SR-IOV enabled NICs

PktBlaster - Traffic Generation and Capture
Transmission/Reception – Up to 16 streams
Port Statistics, Histogram statistics
Packet/Field modifier and automatic protocol decoding
TCL libraries for custom test automation

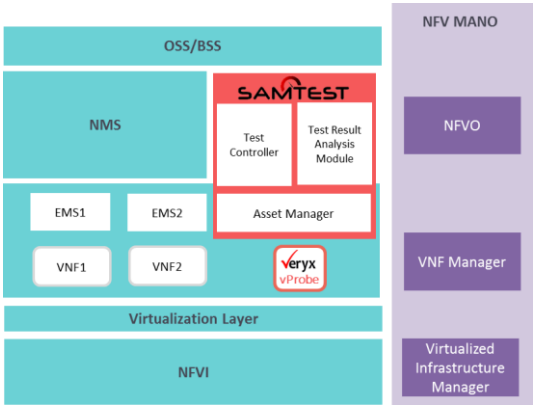


Figure 10: Veryx vProbe Alignment with ETSI MANO Architecture



Veryx Professional Services

Delivering quality products “ready-to-market” is always a challenge. Tight release schedules and resource shortages are the common challenges in product development. Given this, many organizations find it difficult to maintain a dedicated, trained test team equipped with the best tools to accomplish the testing mission.

Veryx’s professional services while effectively complementing and supplementing the customer testing teams’ efforts, also delivers higher efficiency and flexibility with the following execution models.

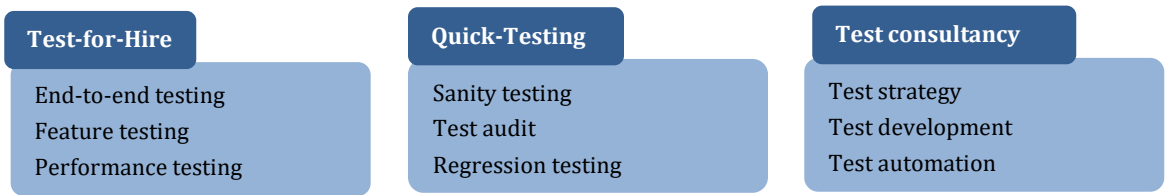


Figure 11: Veryx Professional Services

Test-for-Hire

Test-for-Hire enhances customers’ test team capabilities by leveraging the Veryx SAMTEST test infrastructure, ready-to-use exhaustive test library, well-equipped test lab and an expert testing team. It enables better management of testing lifecycle of products, delivering greater ROI and flexibility, without compromising on quality.

Quick-Testing

Veryx Quick-Testing services provide fast turnaround times for “single cycle” test verification requirements. By utilizing ready-to-use library of test cases, customers are assured of quick results at lower budgets.

Test Consulting

Veryx’s expertise in developing efficient test solutions for its customers can be utilized as Test Consulting services by manufacturers as well as solution providers and large enterprises that need pre-deployment verification of networks.

Veryx can enhance existing test libraries to address new test requirements, increase test coverage and take up the responsibility of testing and maintaining customer baseline(s) on a turnkey basis. Veryx can actively work with customers on enhancing their existing test suites/frames to include additional features. Veryx can also help integrate third party products into its Test automation framework or build custom automation.

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About Veryx Technologies

Veryx Technologies (www.veryxtech.com) is a provider of innovative testing, automation and monitoring solutions for network service providers, cloud service providers, data centers, Enterprise IT and network equipment vendors. Veryx offers solutions for network testing, performance monitoring and equipment testing applications for technologies such as Carrier Ethernet, IP, Cloud, SDN, NFV and Smart Networks.

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